WHAT IS CLAIMED IS:

1. A composition for fabricating phase-change-material microcapsule, comprising:

5% to 40 % weight percentage concentration of waterborne polyurethane aqueous solution;

phase-change-material;

lipophilic monomer; and

solid wax, wherein the weight percentage concentration of the lipophilic monomer solving in the phase change material is between about 3% and 12%, and the weight ratio of lipophilic monomer to waterborne polyurethane is between about 25% and 50%.

2. The composition of claim 1, wherein the waterborne polyurethane in the waterborne polyurethane aqueous solution is selected from a group consisting waterborne polyurethane, 2,2-bis (hydroxymethyl) propionic acid triethylamine salt, diamine containing sulfonate salt and a combination thereof.

3. The composition of claim 1, wherein the phase-change-material is an organic compound with polarity.

4. The composition of claim 1, wherein the phase-change-material is a carboxylic ester.

5. The composition of claim 4, wherein a carboxylate of the carboxylic ester is selected from a group of formate, acetate and propionate.

6. The composition of claim 4, wherein carbon atom number of an alkoxyl of the carboxylic ester are between 10 and 18.

7. The composition of claim 1, wherein the lipophilic monomer is melamine or isocyanate salt.

8. The composition of claim 1, wherein the preferred weight ratio of waterborne polyurethane to microcapsule composition is between about 10% and 30%.

9. The composition of claim 1, wherein the preferred weight percentage concentration of the lipophilic monomer solving in the phase change material is between about 5% and 10%.

10. The composition of claim 1, wherein the preferred weight ratio of lipophilic monomer to waterborne polyurethane is between about 30% and 45%.

11. A method using the composition of claim 1 for fabricating phase-change-material microcapsule dispersing in a water phase, comprising:

putting the composition in a reactor, wherein the composition comprising:
the waterborne polyurethane aqueous solution;

the phase-change-material;

the lipophilic monomer; and

the solid wax;

emulsify the composition by stirring;

performing at least two stages heating process to elevate a temperature of the emulsified composition; and

adding at least one stabilizer.

12. The method of claim 11, wherein a speed of the emulsify by stirring is between about 4000 rpm and 9000 rpm.

13. The method of claim 11, wherein a time for the emulsion by stirring is between about 2 minutes and 5 minutes.

14. The method of claim 11, wherein the temperature range is between about 20 degree Celsius and 90 degree Celsius.

15. The method of claim 11, wherein the elevating temperature further comprising:

keeping aconstant temperature at each stage, wherein the duration is from 1 hour to 5 hours at the stage.

16. The method of claim 11, wherein the waterborne polyurethane in the waterborne polyurethane aqueous solution is selected from a group consisting of waterborne polyurethane, 2,2-bis (hydroxymethyl) propionic acid and its triethylamine salt, diamine containing sulfonate salt and a combination thereof.

17. The method of claim 11, wherein the stabilizer is sorbitan monooleate or sodium dodecyl sulfonate.

18. The method of claim 11, wherein the phase-change-material is an organic compound with polarity.

19. The method of claim 11, wherein the phase-change-material is a carboxylic ester.

20. The method of claim 19, wherein a carboxylate of the carboxylic ester is selected from a group consisting of formate, acetate and propionate.

21. The method of claim 19, wherein carbon atom number of an alkoxyl of the carboxylic ester is between 10 and 18.

22. A phase-change-material for fabricating a microcapsule used between minus 20 degree Celsius and 80 degree Celsius, comprising:

a carboxylic ester, wherein a carboxylate of the carboxylic ester is selected from a group formate, acetate and propionate and carbon atom number of an alkoxyl of the carboxylic ester are between 10 and 28.

23. The phase-change-material of claim 21, wherein carbon atom number of an alkoxyl of the carboxylic ester is preferred between 10 and 18.

24. The phase-change-material of claim 21, wherein the microcapsule is preferred used between minus 20 degree Celsius and 80 degree Celsius.